

REMARKS

In the Office Action, claims 1-32 were rejected. By the present Response, claims 1-32 are amended. Upon entry of the amendments, claims 1-32 will remain pending in the present patent application. Reconsideration and allowance of all pending claims are requested.

Amendments to the Specification

In the Office Action, the Examiner objected to various informalities in the specification. The specification has been amended to address these informalities. With regard to the replacement paragraph provided for page 1, line 22, the Applicants note that support for this amendment is found elsewhere in the specification, such as at page 7, lines 14-17. Therefore, correction of this passage in the background is not believed to introduce new matter.

Double Patenting

The Examiner provisionally rejected claims 1-16 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8 and 17-24 of copending Application No. 10/723,857. Likewise, the Examiner provisionally rejected claims 17-32 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 17-32 of copending Application No. 10/723,857 in view of U.S. Patent No. 5,477,144 (the "Rogers reference"). As neither the copending application nor the present application have issued, and thus no issued claims are purported to be in conflict, the Applicants do not believe that a response is currently needed. The Applicants maintain the right to respond to the assertion of obviousness-type double patenting between the cited copending applications once one of the copending applications matures into an issued patent.

Claim Objections

The Examiner characterized the claims as belonging to two groups with Group I including claims 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29 and 31 and Group II including claims 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, and 32. Based on these groupings, the Examiner objected to the claims of Group II as being substantial duplicates of the claims of group I. In particular, the Examiner stated that: “[t]he steps and features recited in the claims of group II for reconstructing image data are considered obvious over the embodiments recited in the claims of group I. It is known in the art that raw image signal data itself does not produce an image without first being reconstructed, and methods for such reconstruction are also well-known in the art.” Office Action, pp. 3-4

The Applicants traverse this objection and respectfully request the Examiner’s reconsideration. In particular, the Applicants categorically reject the Examiners characterization of the present claims and the Examiner’s misguided application of an obviousness-type analysis between copending claims. As the Examiner will appreciate, the issue is not whether one of ordinary skill would know how to reconstruct an image from raw image data. The Applicant’s proper concern is that the presently recited techniques might be applied to either unprocessed or processed (such as reconstructed), image data. As the Applicants have disclosed and explained how the present techniques might be applied to either raw or processed image data, the Applicants are entitled to claims that protect both types of implementations. The Examiner appears to be improperly attempting to limit the Applicants ability to fairly claim all that the Applicants have disclosed, to the Applicants peril.

Indeed, unless the Examiner can unequivocally state that the claims which the Examiner characterizes as belonging to Group I can be effectively applied to a potential infringer who uses the disclosed retrospective gating points to process reconstructed data, then it is improper for the Examiner to maintain the present objection. Likewise, unless

the Examiner can unequivocally assure the Applicants that a court would interpret the language of the claims of group I to encompass both unprocessed and processed image data, it would be improper for the Examiner to maintain the present objection. Clearly the Examiner can offer no such assurances. Indeed, the Examiner's present objection appears to be designed to force the Applicants to forego protection of certain implementations of their technique, without any guarantee or assurance that the remaining claims would be interpreted by a court as covering the subject matter in question. In view of the clear impropriety of the present objection, the Applicants respectfully request reconsideration and withdrawal of the present objection.

Rejections Under 35 U.S.C. § 101

In the Office Action, the Examiner rejected claims 1, 2, 9, 10, 17, 18, 25 and 26 under U.S.C. § 101 as being directed to non-statutory subject matter. Office Action, p. 4. Applicants respectfully traverse this rejection.

Legal Precedent

According to the Supreme Court, Congress intended statutory subject matter to "include anything under the sun that is made by man." *Diamond v. Chakrabarty*, 447 U.S. 303, 308-09; 206 U.S.P.Q. 193, 197 (1980). Indeed, exclusions of statutory subject matter are limited to laws of nature, natural phenomena and abstract ideas. *See Diamond v. Diehr*, 450 U.S. 175, 185; 209 U.S.P.Q. 1, 7 (1981). Other than these specific exceptions, therefore, nearly anything man made is statutorily patentable subject matter under 35 U.S.C. §101.

In determining when process or method claims include statutory subject matter, the Supreme Court in *Diehr* stated that "[t]ransformation and reduction of an article 'to a different state or thing' is the clue to the patentability of a process claim that does not include particular machines." *See id.* 450 U.S. at 183-185, 209 U.S.P.Q. at 6. In addition to the Supreme Court's transformation and reduction test, the Federal Circuit has

developed a second test which may also be used to determine if a claim recites statutory subject matter, namely does the claim produce a “useful, concrete, and tangible result.” *In re Alappat*, 31 U.S.P.Q.2d 1545, 1557 (Fed. Cir. 1994) (*en banc*). The Federal Circuit further elaborated on this second test by holding that one must look to “the essential characteristics of the subject matter, in particular, its practical utility.” *State Street Bank & Trust Co. v. Signature Financial Group Inc.*, 47 U.S.P.Q.2d 1596, 1602 (Fed. Cir. 1998).

However, explaining this “useful, concrete, and tangible” test, the Federal Circuit has stated “the dispositive inquiry is whether the claim *as a whole* is directed to statutory subject matter.” *In re Alappat*, 31 U.S.P.Q.2d at 1557 (emphasis in original). Indeed, there has been no requirement from Congress, the Supreme Court, or the Federal Circuit mandating that a *specific final result* be shown for a claim to qualify under Section 101. *See id.* Rather, the Federal Circuit has specifically stated “the *Alappat* inquiry simply requires an examination of the contested claims to see if the claimed subject matter *as a whole* is a disembodied mathematical concept representing nothing more than a ‘law of nature’ or an ‘abstract idea,’ or if the mathematical concept has been reduced to *some practical application rendering it ‘useful’*.” *AT&T Corp. v. Excel Communications, Inc.*, 50 U.S.P.Q.2d 1447, 1451 (Fed. Cir. 1999) (emphasis added). Therefore, if a claim meets either the transformation and reduction test put forth by the Supreme Court, or if the claim, read as a whole and in light of the specification, produces any useful, concrete, and tangible result, the claim meets the statutory requirements of Section 101. *See id.*

Applicants respectfully assert that the independent claims 1, 2, 9, 10, 17, 18, 25 and 26, taken as a whole, each recite statutory subject matter under 35 U.S.C. §101 because they produce a useful, concrete and tangible result. The present Application is generally directed to determining the overall motion of an organ of interest using sensor-based and/or image data-based techniques. *See Abstract*. For example, the present application discloses methods extracting retrospective gating points and/or motion

compensation factors for processing image data, either prior or subsequent to reconstruction. *See* Specification, p. 18, line 24 to p. 19, line 24; p. 20, line 23 to p. 21, line 3, p. 21, lines 14-20. The result of the processing steps may be an image of an organ in which motion-related artifacts are substantially reduced. *See Id.* and Abstract.

Accordingly, independent claims 1, 9, 17, and 25 recite, *inter alia*, “A method for processing image data, comprising the steps of... processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors, processing a portion of the set of image data based upon the two or more retrospective gating points and the one or more motion compensation factors, and displaying or storing an image generated from the portion of the set of image data.” Independent claims 2, 10, 18, and 26 recite, *inter alia*, “A method for processing image data, comprising the steps of ... processing the set of motion data to extract two or more retrospective gating points and one or more motion compensation factors, reconstructing the set of image data to generate a set of reconstructed data, processing a portion of the set of reconstructed data based upon the two or more retrospective gating points and the one or more motion compensation factors, and displaying or storing an image generated from the portion of the set of reconstructed data.”

Each claim, therefore, taken as a whole, recites a method for processing image data using retrospective gating points and motion compensation factors whereby a useful image is generated and stored or displayed. Applicants assert that the stored or displayed image is a useful, concrete and tangible result. For example, the image may be used in treating patients, such as for planning therapeutic procedures and so forth, or for diagnosing patients. Accordingly, Applicants respectfully request withdrawal of the rejection of independent claims 1, 2, 9, 10, 17, 18, 25, and 26 under 35 U.S.C. §101.

Rejections Under 35 U.S.C. § 102

The Examiner rejected claims 1-8 and 25-32 under 35 U.S.C. § 102(e) in view of U.S. Patent Publication 2004/0155653 (the "Larson reference"). A *prima facie* case of anticipation under 35 U.S.C. § 102 requires a showing that each limitation of a claim is found in a single reference, practice or device. *In re Donohue*, 226 U.S.P.Q. 619, 621 (Fed. Cir. 1985). As amended, claims 1-8 and 25-32 are believed to distinguish over the Larson reference. Therefore, the Applicants respectfully traverse the present rejection and request reconsideration by the Examiner.

Independent Claims 1-8

With regard to independent claims 1-8, the claims generally recite the acquisition of motion data for two or more organs using sensor-based measurement systems (the recited electrical or non-electrical sensors). This is distinct from the Larson reference which generally describes, as correctly noted by the Examiner, the use of image-based techniques to derive motion data. Office Action p. 5; Larson, Abstract, paragraphs 10, 14, 25, and 35. As clearly set forth in the present application, the acquisition of motion data using sensor-based techniques is distinct from those techniques that utilize the image data itself. Application, Figs 1 and 2, p. 10, line 21 to p. 11, line 12; *see also* p. 11, line 14 to p. 15, line 9. In view of the clear distinction drawn between image-based and sensor-based techniques for measuring motion as set forth in the specification, no reasonable construction of claims 1-8 based on the specification could interpret the recited sensor-based approaches to encompass techniques where motion data is acquired from the image data, as generally disclosed in the Larson reference.

Furthermore, to the extent that the Larson reference does appear to contemplate the use of sensor-based motion measurement techniques, they do not appear to be used for acquiring motion data for two or more organs. Indeed, in what appear to be the only concrete examples in Larson where motion data is acquired for two organs, the motion for both organs is acquired using image data or the motion for one of the organs is acquired

using image data while the motion for the other organ is acquired using sensor data, i.e., conventional ECG. Larson, paragraphs 62-63.

In addition, the Larson reference does not appear to disclose the extraction or use of motion compensation factors, as recited in amended independent claims 1-8. In view of this deficiency, in addition to the deficiencies noted above, no *prima facie* case of anticipation is believed to exist for independent claims 1-8 as amended.

Applicants also wish to respectfully note that the Examiner's interpretation of the recited retrospective gating points is in error. In particular, the Examiner equates the retrospective gating points with the start and end times of a breath hold. Office Action, p. 5. The Applicants believe that one of ordinary skill in the art would appreciate that a breath hold generally corresponds to the interval over which imaging data is acquired and that such a breath hold may contain numerous respective retrospective gating points. For example, in cardiac gating, each heart beat during the breath hold might correspond to a retrospective gating point.

In addition, Applicants also wish to point out that independent claims 5 and 6 are properly formulated so as to invoke the presumption that they are to be interpreted in view of 35 U.S.C. § 112, paragraph 6 as "means-plus-function" type claims. As such, the rejection of these claims should be provided in accordance with M.P.E.P. §§ 2181-2183. Currently no such analysis or rejection has been provided. As the present rejection is insufficient to meet the guidance imposed by the M.P.E.P., the Applicants respectfully note that it would be improper to make a succeeding rejection of these claims final as the Applicants has not been afforded an opportunity to respond to a proper rejection of these claims when properly constructed and analyzed in accordance with 35 U.S.C. § 112, paragraph 6.

Independent Claims 25-32

With regard to independent claims 25-32, the claims generally recite the acquisition of motion data for a heart using sensor-based measurement systems including both electrical and non-electrical sensors. As noted above, this is distinct from the Larson reference which generally recites, as correctly noted by the Examiner, the use of image-based techniques to derive motion data. Office Action p. 5; Larson, Abstract, paragraphs 10, 14, 25, and 35. As clearly set forth in the present application, the acquisition of motion data using sensor-based techniques is distinct from those techniques that utilize the image data itself. Application, Figs 1 and 2, p. 10, line 21 to p. 11, line 12; *see also* p. 11, line 14 to p. 15, line 9. In view of the clear distinction drawn between image-based and sensor-based techniques for measuring motion as set forth in the specification, no reasonable construction of claims 1-8 based on the specification could interpret the recited sensor-based approaches to encompass techniques where motion data is acquired from the image data, as generally disclosed in the Larson reference. Further, the Larson reference appears to be devoid of the use of non-electrical sensors, as set forth in the present application, nor does the Examiner indicate where in the Larson reference such non-electrical sensors are described. Application, p. 12, line 6 to p. 13, line 3.

In addition, as noted above, the Larson reference does not appear to disclose the extraction or use of motion compensation factors, as recited in amended independent claims 25-32. In view of this deficiency, in addition to the deficiencies noted above, no *prima facie* case of anticipation is believed to exist for independent claims 25-32 as amended.

Further, Applicants also wish to point out that independent claims 29 and 30 are properly formulated so as to invoke the presumption that they are to be interpreted in view of 35 U.S.C. § 112, paragraph 6 as “means-plus-function” type claims. As such, the rejection of these claims should be provided in accordance with M.P.E.P. §§ 2181-2183. Currently no such analysis or rejection has been provided. As the present rejection is

insufficient to meet the guidance imposed by the M.P.E.P., the Applicants respectfully note that it would be improper to make a succeeding rejection of these claims final as the Applicants has not been afforded an opportunity to respond to a proper rejection of these claims when properly constructed and analyzed in accordance with 35 U.S.C. § 112, paragraph 6.

Rejections Under 35 U.S.C. § 103

The Examiner rejected claims 9-24 under 35 U.S.C. § 103(a) as being unpatentable over the Larson reference in view of U.S. Patent No. 5,477,144 (the "Rogers reference"). The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Accordingly, to establish a *prima facie* case, the Examiner must not only show that the combination includes *all* of the claimed elements, but also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (B.P.A.I. 1985). When prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). As amended, claims 9-24 are believed to distinguish over the combination of the Larson and Rogers references. Therefore, the Applicants respectfully traverse the present rejection and request reconsideration by the Examiner.

Independent Claims 9-24

With regard to independent claims 9-24, the claims, as amended, generally recite the extraction and application of motion compensation factors. As noted above, such motion compensation factors appear to be absent from the Larson reference, which instead appears to be generally concerned with prospective and retrospective image synchronization techniques. Larson, paragraphs 51 and 52.

Such motion compensation factors also appear to be absent from the Rogers reference. While the Rogers reference does generally describe the generation of signal corrections, such signal corrections do not appear to compensate for motion *per se*, but are instead intended to correct for uneven sampling intervals that can inadvertently modulate the acquired image signal. *See, for example*, Rogers, col. 1, lines 33-40, col. 2, lines 55-59, 66-67, col. 3, lines 16-17, 28-31, 46-47, col. 4, lines 25-28, 41-49, and col. 6, lines. Indeed, as explicitly described by the Rogers reference, “[t]he present invention corrected [sic] for signal intensity modulation caused by heart rate variation as follows.” Rogers, col. 3, lines 16-17. Further, the Rogers reference does explicitly discuss image artifacts caused by object motion and specifically distinguishes these artifacts from the one corrected by the disclosed technique. Rogers, col. 4, lines 41-49. Indeed, in describing the techniques that may be used for correcting artifacts related to object motion, the Rogers reference specifically notes that “these methods do not address nor do they correct for the specific artifact described in the present invention.” Rogers, col. 4, lines 47-49 (emphasis added). Therefore, the Rogers reference does not obviate the deficiencies of the Larson reference and the cited combination fails to disclose the generation and application of motion compensation factors as presently recited.

In view of this deficiency, no *prima facie* case of obviousness is believed to exist for independent claims 9-24 as amended.

Further, Applicants also wish to point out that independent claims 13, 14, 21, and 22 are properly formulated so as to invoke the presumption that they are to be interpreted in view of 35 U.S.C. § 112, paragraph 6 as “means-plus-function” type claims. As such, the rejection of these claims should be provided in accordance with M.P.E.P. §§ 2181-2183. Currently no such analysis or rejection has been provided. As the present rejection is insufficient to meet the guidance imposed by the M.P.E.P., the Applicants respectfully note that it would be improper to make a succeeding rejection of these claims final as the Applicants has not been afforded an opportunity to respond to a proper rejection of these claims when properly constructed and analyzed in accordance with 35 U.S.C. § 112, paragraph 6.

General Authorization for Extensions of Time

In accordance with 37 C.F.R. § 1.136, Applicants hereby provide a general authorization to treat this and any future reply requiring an extension of time as incorporating a request therefor. Furthermore, Applicants authorize the Commissioner to charge the appropriate fee for any extension of time to Deposit Account No. 07-0845; Order No. GEMS:0263/YOD/RAR (132958XX-C).

Conclusion

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'John M. Rariden', is written over a horizontal line.

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